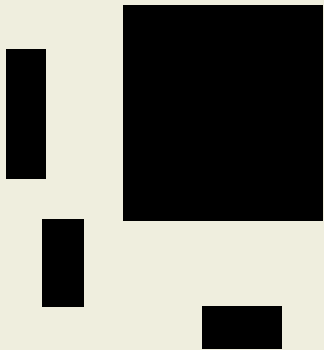# National Flood Insurance Program: Risk Transfer & Tools

Samantha Medlock, CFM
Capital, Science & Policy

May 7, 2019

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NFIP Reinsurance

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NFIP Reinsurance Timeline

- 2012 - 2014
  - Congress granted FEMA authority to secure reinsurance from the private reinsurance and capital markets through the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12) and the Homeowners Flood Insurance Affordability Act of 2014 (HFIAA).
- 2015
  - Flood Insurance Risk Study to investigate feasibility and benefits of an NFIP Reinsurance Program
- 2016
  - Test Placement of Reinsurance
- 2017
  - FEMA secured $1.042 billion in traditional reinsurance coverage from 25 reinsurers
  - Hurricane Harvey – FEMA recovered $1.042 billion in reinsurance

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NFIP Reinsurance Timeline

- 2018
  - FEMA secured $1.46 billion in traditional reinsurance coverage from 28 reinsurers
 - FEMA entered 3-year reinsurance agreement that transfers $500 million in NFIP risk to the capital markets
- 2019
  - FEMA secured $1.32 billion in traditional reinsurance coverage from 28 reinsurers
  - FEMA entered 3-year reinsurance agreement that transfers $300 million in NFIP risk to the capital markets

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Catastrophe Modeling

US Flood

U.S. Flood analytics – historical view

- Flood is a complex peril to model
  - Technological barriers made it difficult to adequately generate a complete view of flood hazard
  - Without a private market for residential flood, commercial vendors didn't invest resources in developing a model
  - Technology advances and market pressures have changed the landscape of flood analytics
- FEMA maps have largely been the basis for evaluating flood risk in the U.S.
  - These maps only determine if a risk is in or out of a flood zone, without providing information on potential flood depths
  - FEMA maps are hazard-only, and do not consider vulnerability or financial terms to help determine losses
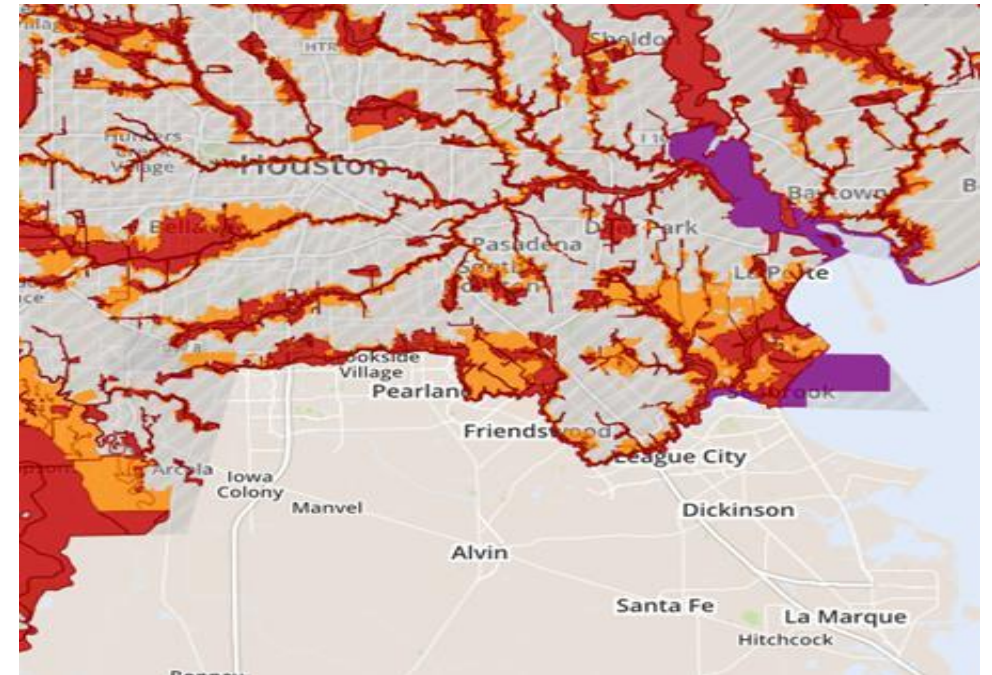
Coverage and extent of FEMA Flood Insurance Rate Maps (FIRMs)

- FEMA FIRMs do not cover the entire U.S.
  - There is not a consistent methodology for developing FEMA flood maps across the country
  - Many areas have maps that are outdated, based on old technology, or do not take into account construction and development
  - Older maps have not been digitized

- In many areas FEMA FIRMs cover the main rivers but not smaller streams
- It is important to model the water getting to the rivers as well as out of the rivers
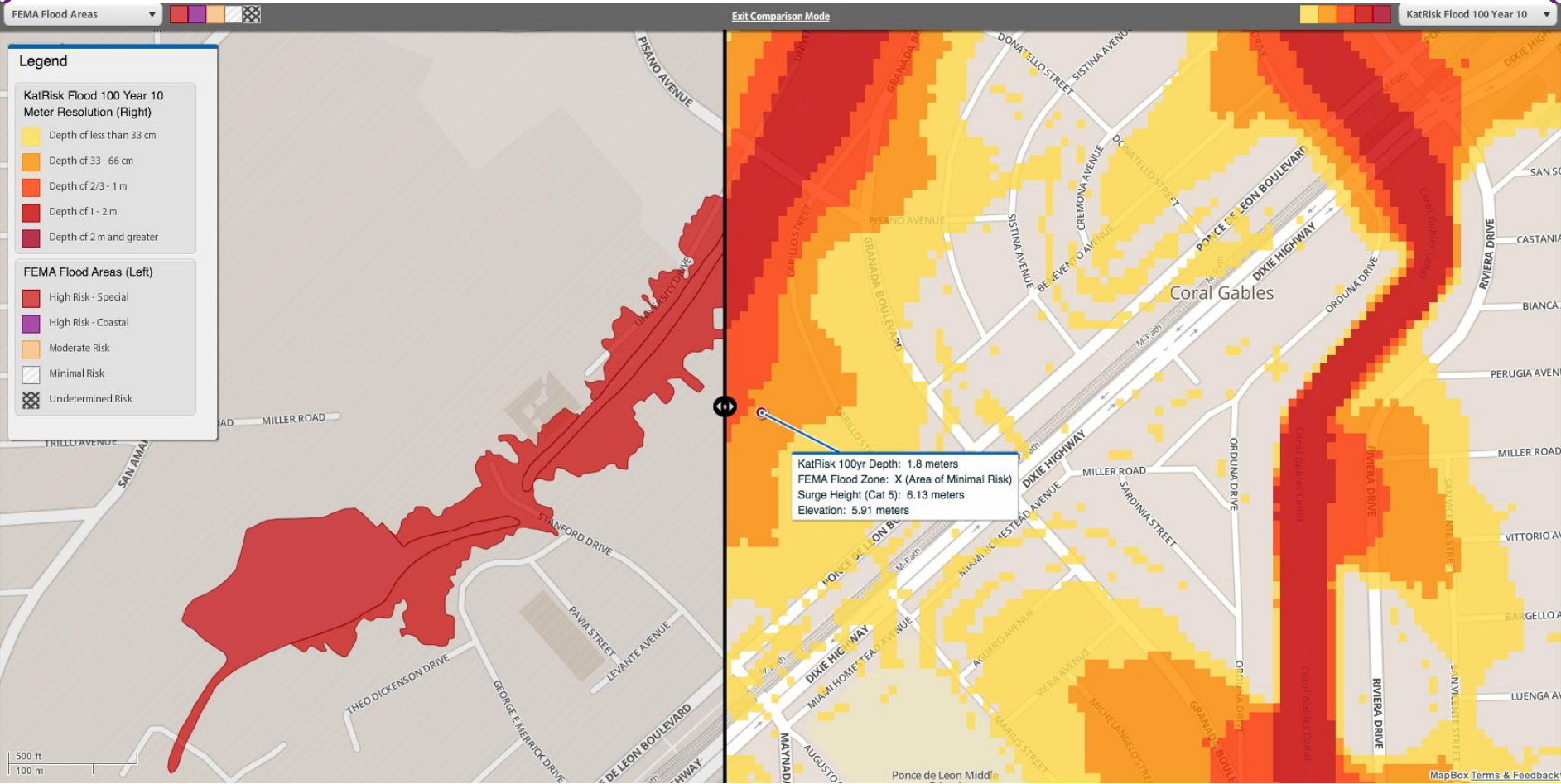
Red outlines – FEMA 100 year flood zones

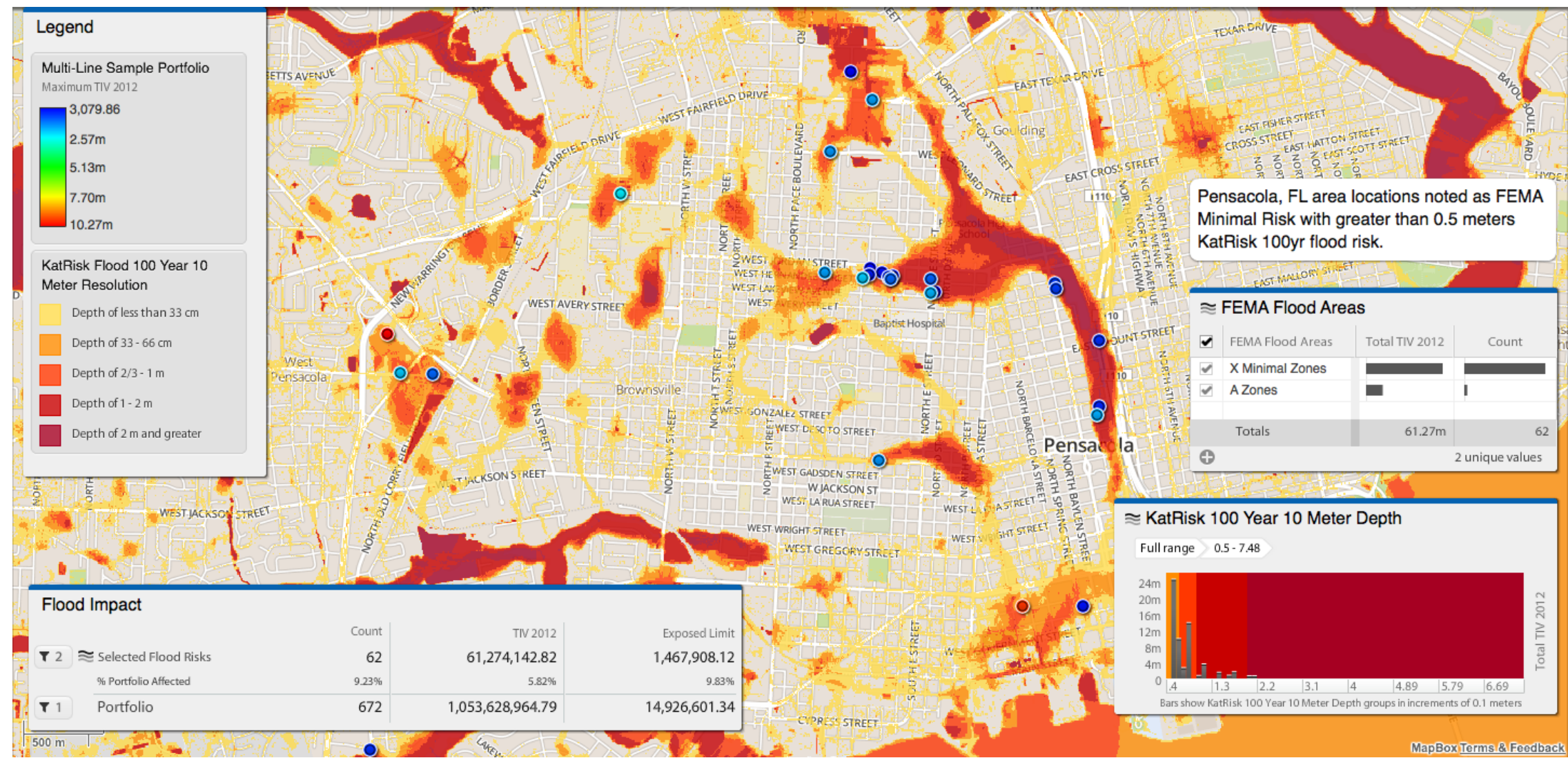Blue shading – high resolution model including pluvial (surface) and fluvial (riverine) flooding

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Hazard Analyst app – compare data sources

Left side displaying FEMA data

Right side displaying KatRisk data

FEMA Flood Areas

Exit Comparison Mode

KatRisk Flood 100 Year 10

Legend

KatRisk Flood 100 Year 10
Meter Resolution (Right)

- Depth of less than 33 cm
- Depth of 33 - 66 cm
- Depth of 2/3 - 1 m
- Depth of 1 - 2 m
- Depth of 2 m and greater

FEMA Flood Areas (Left)

- High Risk - Special
- High Risk - Coastal
- Moderate Risk
- Minimal Risk
- Undetermined Risk

KatRisk 100yr Depth: 1.8 meters
FEMA Flood Zone: X (Area of Minimal Risk)
Surge Height (Cat 5): 6.13 meters
Elevation: 5.91 meters

Confidential and Proprietary

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Asset and Portfolio Risk Assessment

Legend

Multi-Line Sample Portfolio
Maximum TIV 2012

- 3,079.86
- 2.57m
- 5.13m
- 7.70m
- 10.27m

KatRisk Flood 100 Year 10 Meter Resolution

- Depth of less than 33 cm
- Depth of 33 - 66 cm
- Depth of 2/3 - 1 m
- Depth of 1 - 2 m
- Depth of 2 m and greater

Pensacola, FL area locations noted as FEMA Minimal Risk with greater than 0.5 meters KatRisk 100yr flood risk.

≈ **FEMA Flood Areas**

FEMA Flood Areas	Total TIV 2012	Count
✓ X Minimal Zones		
✓ A Zones		
Totals	61.27m	62

2 unique values

≈ **KatRisk 100 Year 10 Meter Depth**

Full range   0.5 - 7.48

Bars show KatRisk 100 Year 10 Meter Depth groups in increments of 0.1 meters

Flood Impact

	Count	TIV 2012	Exposed Limit
▼ 2 ≈ Selected Flood Risks	62	61,274,142.82	1,467,908.12
% Portfolio Affected	9.23%	5.82%	9.83%
▼ 1 Portfolio	672	1,053,628,964.79	14,926,601.34

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Implementation: Insurance Innovations

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The Tools: Indemnity / Parametric Insurance

Indemnity

- Pays on actual loss
- HIGH cost of loss adjustment
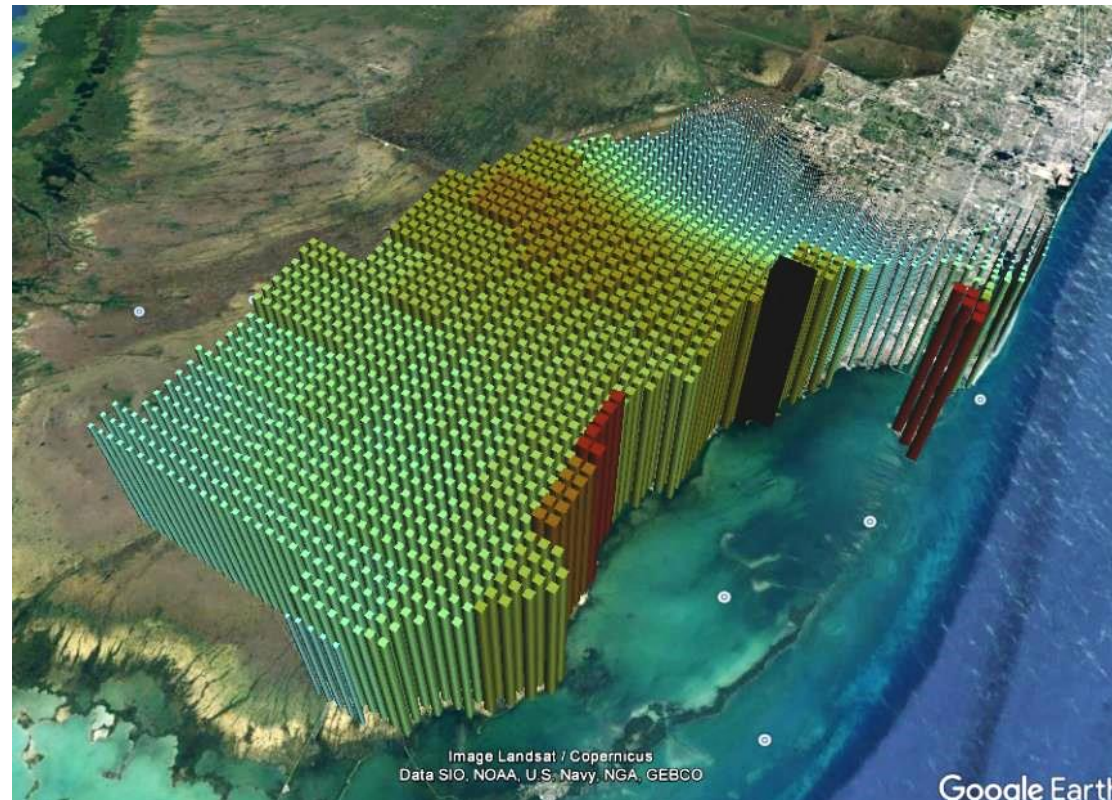- Payment delays due to loss adjustment

Parametric

- Faster Payment upon triggering event
- Simple, easy to understand
- Event trigger defined by independent agency data (USGS, NOAA)
- Basis Risk

Images courtesy of NOAA

HydroMet Triggers

- **Rainfall**
- **Flow / CFS**
- **Water Surface Elevation**
- **Wind Speed**
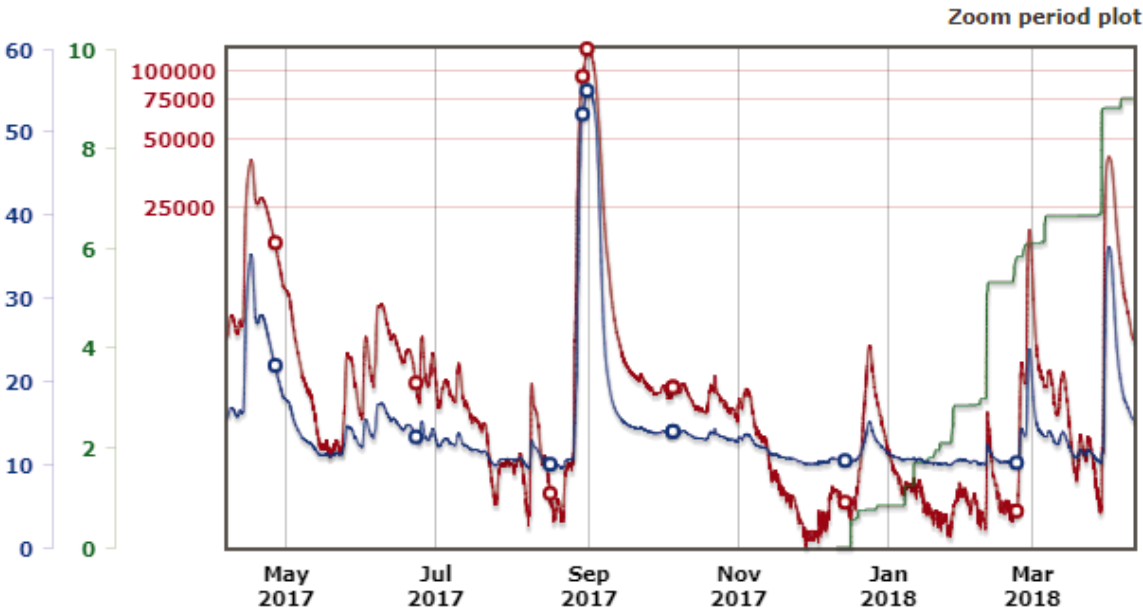- **Temperature**

Gage images courtesy of NOAA

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Structuring for a Trigger-Based Solution for Flood and Drought Case Study for Texas River District

- Risks from localized rainfall and river flows from upstream precipitation

- Structure accounts for both of these risks with separate triggers that can operate independently and in combination

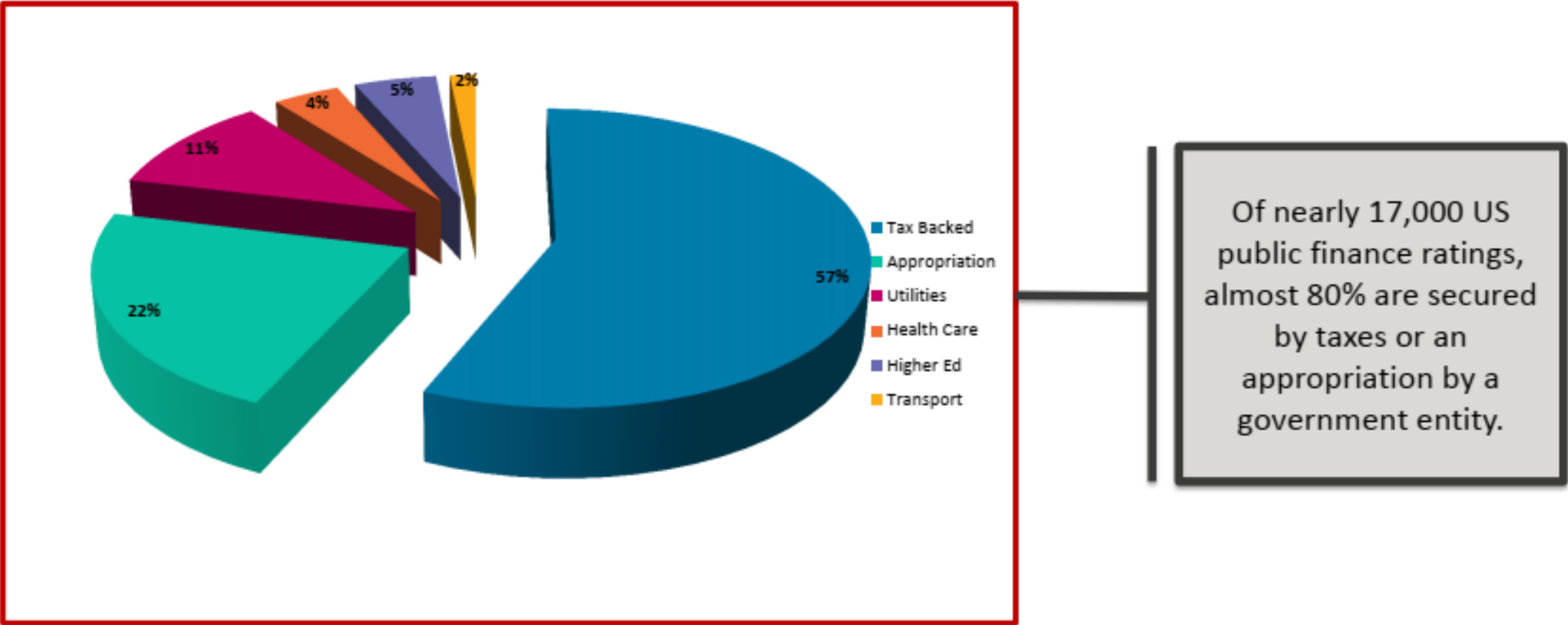- Graduated payouts support non-damage costs and damaging droughts and floods

USGS 08114000 Brazos Rv at Richmond, TX

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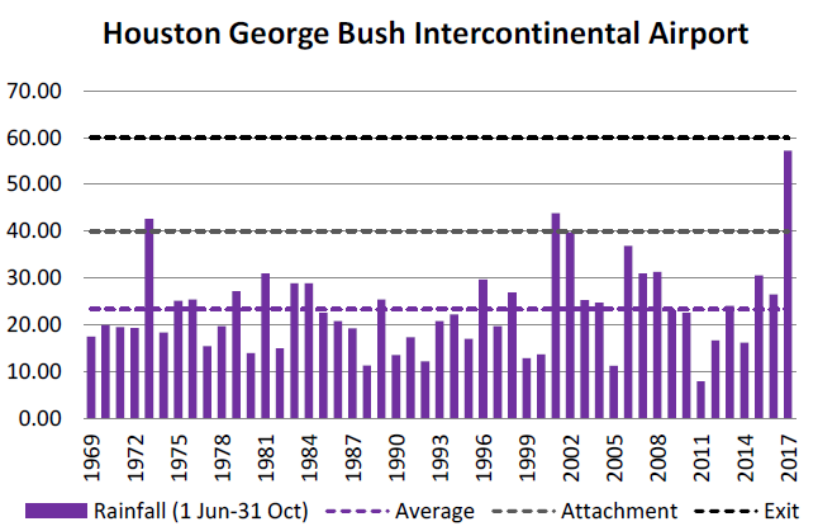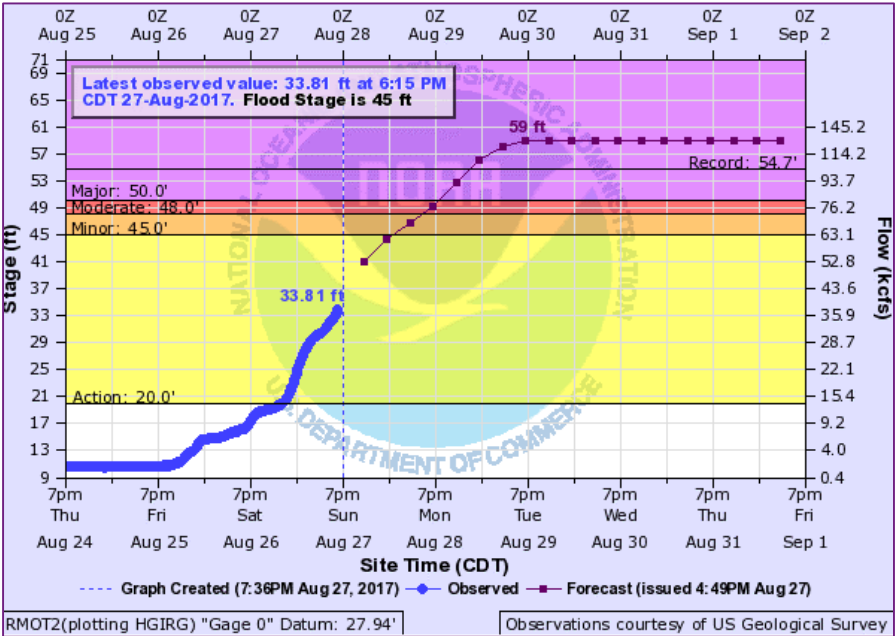
Public Finance & Credit Risk

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14

US Public Finance Issue Ratings By Sector

Legend:
- Tax Backed — 57%
- Appropriation — 22%
- Utilities — 11%
- Health Care — 4%
- Higher Ed — 5%
- Transport — 2%

Of nearly 17,000 US public finance ratings, almost 80% are secured by taxes or an appropriation by a government entity.

What Is A Credit Rating?

Assessing Creditworthiness of Issuers and Obligations

What Credit Ratings Are
Opinions about relative credit risk
Opinions about ability and willingness of an issuer to meet financial obligations in full and on time
Forward-looking and continually evolving
Comparable across different sectors and regions

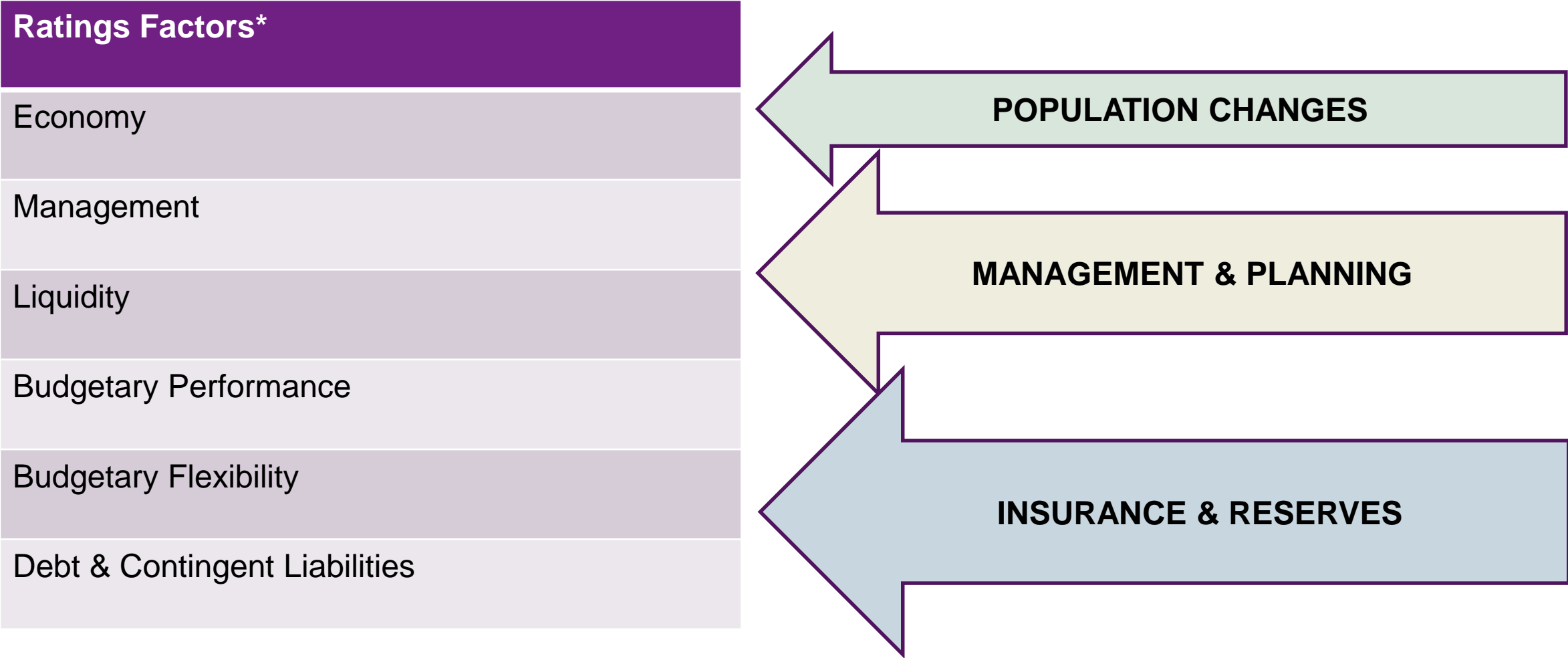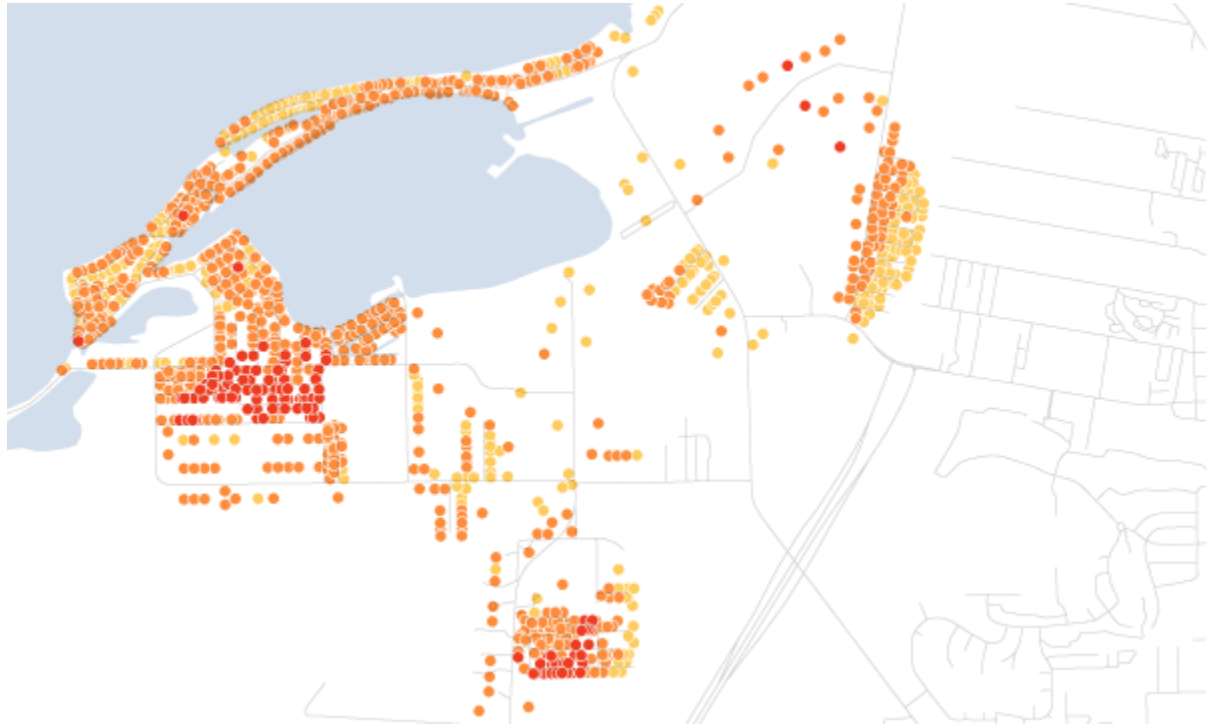| What Credit Ratings Are NOT |
| --- |
| Indications of market liquidity or price |
| Investment advice or guarantee of future credit risk |
| Absolute measures of default probability |
| Expected ultimate loss in the event of default |

Public Finance & Flood Risk

Local Government Ratings

Ratings Factors*
Economy
Management
Liquidity
Budgetary Performance
Budgetary Flexibility
Debt & Contingent Liabilities

POPULATION CHANGES

MANAGEMENT & PLANNING

INSURANCE & RESERVES

Case Study: Rockport, Texas

Each dot is one building ● Destroyed ● Major damage ● Minor ● Some flooding

Source: Federal Emergency Management Agency,

- **Approximately 80% of structures in Aransas County sustained damage from Hurricane Harvey**

- **60% of residents were displaced**

- **Rockport was downgraded based on credit rating agency's view of:**

  - **Potential tax base deterioration**

  - **Revenue declines**

  - **Rockport's uncertainty with regard to its budgetary performance and flexibility following Harvey**

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